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# The teleconsultation service ENDOTEL Implementation and first experiences

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**Abstract.** The multimedia teleconsultation service ENDOTEL launches in May 2000 with its asynchronous component. In the initial phase, three hospitals and four general practitioners use the service to consult a specialist in the domain of gastroenterology and endoscopy. By validation of the patient information, i. e. videos, voice clips, still images and text, the experts can decide the further proceeding, for example, whether a patient shall be transported to a specialized hospital or not (cost-saving). We report about the expieriences during the initiation and the first months of operation.

## 1. Introduction

Last year, at the MIE '99, we have presented the concept and architecture of the service ENDOTEL [1]. The present paper describes the current status of the project. We report on the experiences with the asynchronous component of the teleconsultation system during start-up and the first few month of operation. The telemedicine project ENDOTEL (Endoscopy Teleservices) is managed by the Department of Medical Statistics and the Second Medical Clinic at the Klinikum rechts der Isar of the Technical University of Munich in co-operation with the Telehaus Stamsried. The project is sponsored by the Bavarian State Government and the European Commission. In the initial phase, three hospitals and four general practitioners (GP) use the service to consult a specialist in the domain of gastroenterology and endoscopy (figure 1).

The picture-giving examinations in the field of gastroenterology show a great inter- and intra-observer variability. Therefore the second opinion of a specialized expert is much asked for. Nowadays this consultations are normally made by telephone or mail. The service ENDOTEL uses a "multimedia email" to exchange the necessary data between general practitioners, hospitals und medical centres of universities.

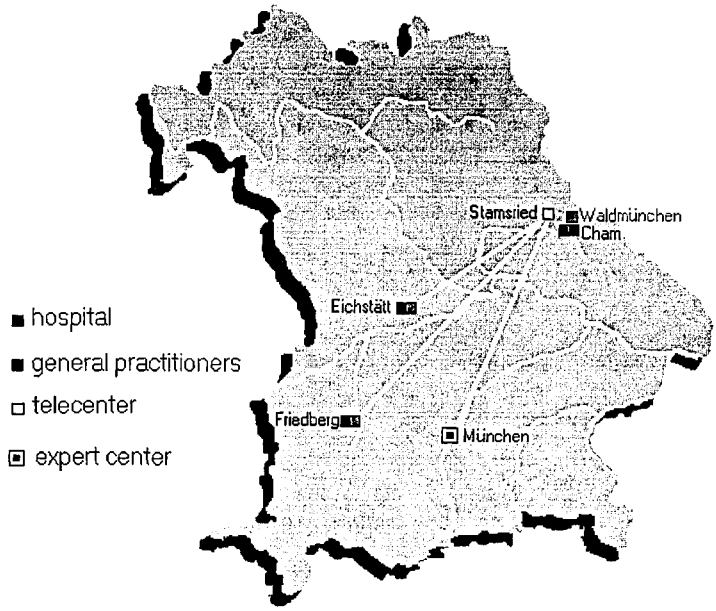


**Figure 1:** Connected participants (start-up)

## 2. Design and technologies

For the design of the ENDOTEL system the Unified Modelling Language (UML) was used [2,3]. The software has been developed as a Java application. The four integrated editors (video, audio, scan, text) are coded in C++. The software is identical for all project partners, because everyone can be consultant or questioner. The completion of the software, which was planned for January 2000, has prolonged due to technical problems with the hardware. There were problems to find a video card fulfilling all requirements at a maintainable price. The software development was finished in March 2000. A test period of the application in the Department of Medical Statistics followed. During this test serious problems with the synchronisation of the video signal during recording (digitalisation) and replay occurred. Finally, the pilot operation of the service started end of May 2000.

All participants communicate via a server, which is located at the telecenter Telehaus Stamsried. On this server a Postgres database is used. A personal computer with the ENDOTEL teleconsultation software installed, was made available for each participating hospital and GP. The client database on these computers is a MS Jet-Engine. The hospital of the city of Cham and the Klinikum rechts der Isar are connected through a 2 Mbit/sec network with the server in Stamsried. The other hospitals and the doctors' offices have a 128 Kbit/sec ISDN connection.

In the first period of operation, anonymized data are transferred. In the next step conformity to the Health Care Professionals Protocol (HCPP) of the Bavarian Statutory Health Care Administration and the Bavarian Medical Association [4,5,6] will be achived.

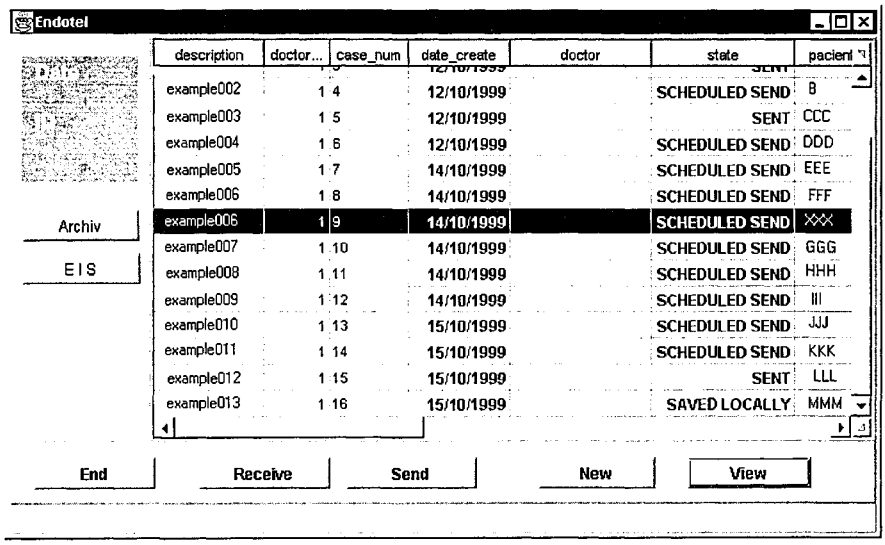


**Figure 2:** Screenshot of the graphical user interface - main screen

## 3. The teleconsultation software

The ENDOTEL application starts with the main screen (figure 2). Here the user looks for incoming messages and creates new requests respectively. He can also switch to the endoscopy information system in the Internet or look at cases stored in his local archive. If he wants, for example, to create a new request, he pushes the button "New". The case screen opens (figure 3). This window includes four editors to process video digitalisation, audio recording, image scanning and text editing. The doctor decides which media he wants to add to the case. For example, if he wants to add a short video sequence of an endoscopic examination, he opens the video editor. He puts the video cassette into the video recorder connected and pushes the "Start" button of the video recorder. Now he selects the sequence by pushing the "Record" button ("Start/Stop") of the editor. When this is finished he can add a further video sequence or another media. He can formulate his questions to the colleague by recording a voice clip or typing in text.

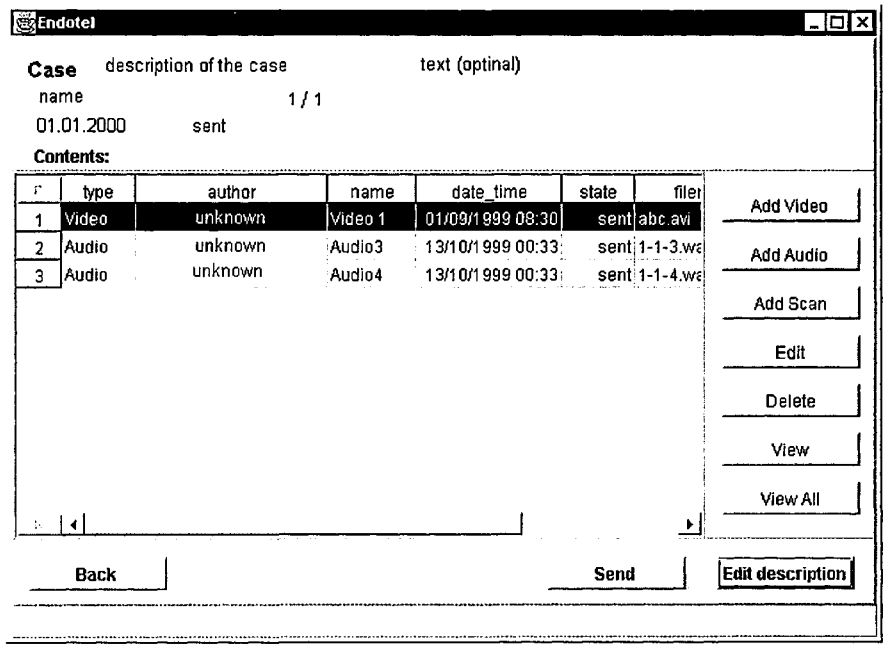


**Figure 3:** Screenshot of the graphical user interface - case screen

## 4. Evaluation and outlook

The start-up of the teleconsultation service was in May 2000. In August 2000, when the MIE 2000 congress starts, the system will have been in operation for two month. During this period, approximately 50 tele-consultations are expected. To evaluate the success of the project the benefit of the system with respect to financial savings, quality of medical treatment and convenience for the patients will be measured [7,8].

The ENDOTEL service was presented to an audience of 800 medical specialists at the 106th congress of the German Society of Internal Medicine. The reaction was a most intensive interest to participate in this telemedical service.

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